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(71) Applicant: **SHIBATA IRON WORKS CO., LTD.**
6-33 Shibagaki 1-chome
Matsubara-shi, Osaka Pref.(JP)

(72) Inventor: **Shibata, Kikuji**
6-33 Shibagaki 1-chome
Matsubara-shi, Osaka Pref.(JP)

(74) Representative: **Wilkinson, Stephen John**
Stevens, Hewlett & Perkins
1 St. Augustine's Place
Bristol BS1 4UD (GB)

(54) **Shearing apparatus.**

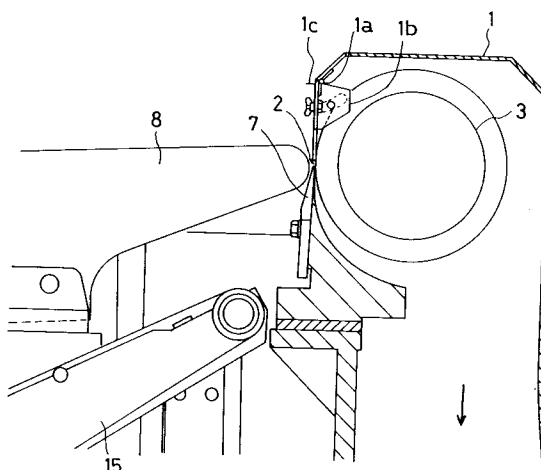
(57) A shearing apparatus of this invention provides an uniform thread shearing, and a high discharging capability of sheared threads. Even when a discharging power is raised by increasing a suction power of a suction box 1, a cloth having threads subjected to shearing passing on a shearing table 8, will not float from the shearing table 8 thereby providing a uniform shearing and preventing from giving damages to the cloth.

An outer wall having a shutter forming a slit 2 is hinged to the suction box 1, being rotatable with respect to the wall of the suction box 1 thereby adjusting an angle of said outer wall with respect to the suction box. Inside the suction box 1, there is provided a rotating blade 3 comprising a cylinder 4 having plurality of radially disposed ditch 5 on the surface of the cylinder where blades 6 extending lengthwise are fixed parallel each other. A fixed blade 7 is disposed close to the rotating blade 3, confronting the slit 2 of the suction box 1 and forming a part of the wall of the suction box 1. A hollow shearing table 8 having many small apertures on its surface connected to a suction means is disposed in front of the slit 2, outside the suction box and movable with respect to the slit 2 of the suction box 1.

A permeable conveyer may be disposed on the hollow shearing table 8 or a rolling roller 11 having

many apertures may be disposed at the top edge of the hollow shearing table 8 and confronting the slit 2 of the suction box 1.

【 F i g . 3 】



FIELD OF THE INVENTION

The invention relates to a shearing apparatus for shearing threads upon a cloth or the like (includes a leather, a fur and an unwoven fabric, hereinafter refer to only as a cloth) and further more specifically relates to a shearing apparatus for trimming raised threads on a surface of the cloth thereby producing a cloth having a plane and shining surface.

BACKGROUND OF THE INVENTION

A conventional shearing apparatus comprises as shown in Figure 10 and Figure 11, a plurality of spiral cutter blades 36 disposed on an outer surface of a cylinder 34 and a fixed blade 37 disposed under said spiral cutter blades. Threads on a cloth 24 are sheared while the cloth passes on a shearing table 38 and a relative position of the spiral cutter blades and a fixed blade are adjustable and both the spiral cutter blades and the fixed blade are movable upwardly and downwardly relative to the shearing table 38.

In the above described conventional shearing apparatus, to increase a shearing efficiency, it is necessary to rotate the cylinder having the spiral blades at a high speed or to increase the number of the spiral blades disposing closely each other on the cylinder. But when the spiral blades rotates at a very high speed, a wind caused by the rotating blades blows down the threads on the cloth, subsequently uniform shearing is not carried out throughout the cloth. On the other hand the spiral blades are disposed closely each other, sheared threads get stuck between the blades which causes machine troubles.

Further, sheared threads float in the air which harms the environment. They also stick to the blades and fall down on the cloth which prevents a smooth shearing.

To solve the problems of sticking, it is proposed to dispose a suction nozzle near the blades but it is not a complete solution. Because when the suction power is increased, the cloth passing through the shearing table floats up from the shearing table it becomes difficult to shear the threads uniformly or the cloth itself is damaged while it passes through the blades.

SUMMARY OF THE INVENTION

The objective of the invention is to provide a shearing apparatus having a uniform shearing capability and a high discharging capability of the sheared threads.

Another objective of this invention is to provide shearing apparatus preventing a cloth from floating

from the shearing table thereby shearing the threads uniformly and giving no damages to the cloth subjected to shearing even when the suction power is comparatively high.

The invention of this application is to solve the above described problems. The invention of claim 1 is a shearing apparatus comprising a suction box having a slit, a rotating blade disposed inside said suction box and confronting said slit, a fixed blade disposed along an outer wall of said suction box and confronting said slit, and a shearing table disposed outside said suction box and a top edge of the shearing table is confronting said slit.

The invention of claim 2 is a shearing apparatus of claim 1 wherein the outer wall of said slit is rotatably hinged to said suction box, thereby adjusting an angle of said outer wall with respect to said suction box and a shutter is disposed on said outer wall of said suction box.

The invention of claim 3 is a shearing apparatus of claim 1 or claim 2 characterized in said rotating blade comprises a cylinder having plurality of radially disposed ditch on the surface of the cylinder where blades extending lengthwise are fixed parallel each other.

The invention of claim 4 is a shearing apparatus of claim 1 characterized in said shearing table is movable with respect to said suction box and on the other hand suction box is fixed.

The invention of claim 5 is a shearing apparatus comprising a suction box having a slit being connected to a suction means, a rotating blade disposed inside said suction box and confronting said slit, a fixed blade disposed along an outer wall of said suction box and confronting said slit, and a hollow shearing table connected to a suction means, disposed outside said suction box having many apertures on its surface and a top edge of the shearing table is confronting said slit.

The invention of claim 6 is a shearing apparatus of claim 5 characterized in a permeable belt conveyer is slidably disposed on said hollow shearing table.

The invention of claim 7 is a shearing apparatus of claim 5 or 6 characterized in a roller having apertures on its surface being disposed at the top edge of the hollow shearing table where confronting the slit of the suction box.

The invention of claim 8 is a shearing apparatus of claim 5 or 7 characterized in said hollow shearing table is movable with respect to said suction box and the suction box is fixed.

When operation of above described shearing apparatus, inside the suction box is kept negative pressure by inhaling the air with the suction means connected to the suction box. And raised threads upon the cloth are sheared by the rotating blade and the cooperating fixed blade while inhaling the

air through the slit of the suction box.

The air inhaled from the slit into the suction box causes a wind thereby erecting and stretching the threads on the cloth subjected to shearing, subsequently uniform shearing is obtained. Further sheared threads are blown into the suction box through the blades of the rotating blade and there is no worry about the sheared threads getting stuck between the blades disposed on a rotating cylinder.

In this case, a suction power is not necessarily big to draw the sheared threads into the suction box therefore the cloth subjected to shearing will not float from the surface of the shearing table.

In case a shearing is conducted using a shearing apparatus of claim 2, a width, a position and an angle of the slit is adjusted depending on characteristics of the cloth subjected to shearing by adjusting the positions of the outer wall which consists a part of the slit, the shutter and the fixed blade.

When a shearing apparatus of claim 3 is in operation, the air inhaled from the slit passes very rapidly between the blades disposed on the surface of the cylinder and through the ditches equidistantly disposed at the cylinder and into the suction box. Consequently threads upon the cloth are erected and stretched which is preferable for uniform shearing and the sheared threads are smoothly flow into the suction box without getting stuck between the the blades of the rotating blade.

When a shearing apparatus of claim 4 is used for shearing threads of the cloth, the relative position between the shearing table and rotating blade or fixed blade is adjusted by moving laterally or rotating the shearing table.

When a shearing apparatus of claim 5 is in operation, suction means connected to the suction box or the hollow shearing table are operated to cause negative pressure inside the suction box and the hollow shearing table. A wind cause by the negative pressure blows up and stretches or straightens threads on the cloth so that a uniform shearing is carried out. Threads are sheared while they contact the rotating blade and the fixed blade and the wind passes through the slit into the suction box carrying the sheared threads into the suction box, while the cloth subjected to shearing being conveyed on the shearing table is absorbed onto the hollow shearing table and prevented from floating from the shearing table.

When a shearing apparatus of claim 6 is used for shearing, a permeable conveyer belt disposed on the shearing table is synchronized with the movement of the cloth which is absorbed onto the shearing table by the negative pressure therefore a kinetic resistance between the cloth and the shearing table is reduced.

In case a sheet of cloth of short length is subjected to shearing, the sheet of cloth is placed on the permeable belt conveyer to absorb the sheet onto the shearing table by the negative pressure and the conveyer belt carries the sheet to the blades for shearing.

When shearing apparatus of claim 7 is used for shearing, a roller having apertures around its surface disposed at the top edge of the shearing table reduces a kinetic resistance between the cloth and the shearing table as it rolls synchronizing the movement of the permeable belt conveyer.

When a shearing apparatus of claim 8 is in operation, the relative position between the shearing table and rotating blade or fixed blade is adjusted by moving laterally or rotating the shearing table.

According to the invention of this application, the air inhaled through the slit flows rather fast into the suction box, therefore the threads on the cloth moving on the shearing table are erected and stretched by the wind caused by the air flow. Therefore even in case the rotating blades rotates at very high speed, threads are sheared uniformly and effectively and one can enjoy a high shearing efficiency. Sheared threads are blown into the suction box through the blades of the rotating blade and there is no worry about the sheared threads getting stuck between the blades disposed on a rotating cylinder.

In this case, a suction power is not necessarily big to draw the sheared threads into the suction box therefore the cloth subjected to shearing will not float from the surface of the shearing table and the cloth will not be damaged.

In case a shearing is conducted using a shearing apparatus of claim 2, by adjusting a width, a position and an angle of the slit depending on characteristics of the cloth subjected to shearing through moving the position of the outer wall, the position of the blade and the position of the shutter, subsequently uniform and effective shearing is conducted.

When a shearing apparatus of claim 3 is in operation the air inhaled from the slit passes very rapidly between the blades disposed on the surface of the cylinder and through the ditches equidistantly disposed at the cylinder into the suction box. Consequently threads on the cloth are erected and stretched which makes possible a uniform shearing and the sheared threads are smoothly flow into the suction box without getting stuck between the blades of the rotating blade.

As the shearing apparatus of claim 4 is used for shearing threads of the cloth, an adjustment of the relative position between the shearing table and the rotating blade or the fixed blade is conducted as follows. A position of the rotating blade and the

fixed blade is fixed and the shearing table comparatively light weighted than the suction box which contains the rotating blade and the fixed blade, is moved to adjust the relative position. An adjusting operability is improved compared with the prior art adjusting operation in which the rotating blade or fixed blade is moved vertically. Further it is possible to prevent a vibration of the rotating blade rotating at very high speed. So the shearing operation is stable and effective.

When a shearing apparatus of claim 5 is in operation, suction means connected to the hollow shearing table causes a negative pressure inside the hollow shearing table, and the cloth subjected to shearing moving on the shearing table is absorbed onto the hollow shearing table and prevented from floating from the shearing table and being damaged. So an uniform shearing is carried out.

When a shearing apparatus of claim 6 is in operation, a permeable conveyer belt is synchronized with the movement of the cloth which is absorbed onto the shearing table by the negative pressure therefore a kinetic resistance between the cloth and the shearing table is reduced. So an uniform shearing is carried out.

Even a sheet of cloth of short length can be subjected to shearing by absorbing the sheet of short length onto the shearing table by the negative pressure.

When shearing apparatus of claim 7 is used for shearing, a roller disposed at the top edge of the shearing table reduces a kinetic resistance between the cloth and the shearing table and provides a smooth shearing operation.

When a shearing apparatus of claim 8 is in operation, an adjustment of the relative position between the shearing table and rotating blade or fixed blade is conducted as follows. A position of the rotating blade and the fixed blade is fixed and the shearing table comparatively light weighted than the suction box which contains the rotating blade and the fixed blade is moved to adjust the relative position. An adjusting operability is improved compared with the prior art adjusting process. Further even if the rotating blade rotates at a very high speed, a vibration of the rotating blade is suppressed and a shearing operation is stable therefore a shearing efficiency is improved.

BRIEF EXPLANATION OF THE DRAWINGS

Figure 1 is a plane view of the shearing apparatus of the invention and an auxiliary apparatus of the shearing apparatus.

Figure 2 is an elevation view of the shearing apparatus.

Figure 3 is an enlarged elevation view of the shearing apparatus.

Figure 4 indicates a cylinder of the rotating blades.

Figure 5 is a sectional vies of the rotating blades.

Figure 6 is an example of a shearing table.

Figure 7 is an example of a shearing table.

Figure 8 is an example of a shearing table.

Figure 9 is an example of a shearing table.

Figure 10 is a rotating blades of a conventional shearing apparatus.

Figure 11 is a schematic diagram of a conventional shearing apparatus.

DETAILED DESCRIPTION OF THE INVENTION

The invention is further explained referring to the embodiments of the invention.

A shearing apparatus of the invention comprises a suction box 1, a rotating blade 4, a fixed blade 7, a shearing table 8, and upper guide table 15, and a lower guide table 18.

A slit 2 is disposed at the side of the suction box 2, with which a suction means 12 is connected through a shutter(not shown), thereby controlling a suction power. Inside the suction box 2, there is disposed a rotating blade 3 confronting the slit 2, and outside the suction box 1 there is disposed a fixed blade 7 close to the slit 2.

The slit 2 consists of an outer wall 1b, which is rotatably hinged to the suction box 1 with a hinge 1a thereby adjusting an angle of the outer wall with respect to the suction box and the fixed blade 7. Further a shutter 1c is slidably disposed at the outer wall 1b thereby a width of the slit is adjustable.

The rotating blade 3 consists of a cylinder 4 and having several spiral blades 6 extending lengthwise, more specifically 5 to 8 blades are placed almost parallel in the ditches 5 disposed on a surface of the cylinder.

In this embodiment, a blade 6 is fixed to the cylinder with bolts (not shown) and a threaded hole 4a is disposed at the cylinder thereby preventing the blades from bending while shearing operation and keeping a shearing angle at a small value, for example 7 to 15 degree (almost parallel) consequently threads on the cloth are effectively and uniformly sheared because the angle between the rotating blade and the fixed blade is small.

Fixing measure of the blade to the cylinder is not limited to the above described measure, but any other measures, such as fixing the blades without disposing ditches on the surface of the cylinder or flanges are disposed at both end of the blade where the blade is fixed to the cylinder with bolts.

The rotating blade 3 on the cylinder is driven by an electric motor 23 with pulley and a driving belt.

A shearing table 8 is disposed in front of the slit 2. The shearing table is hollow as shown in Figure 6, having many apertures 9 on its surface with which a suction means 19 is connected through a shutter(not shown), thereby controlling a suction power. It is preferable to dispose a lot of apertures 9 in the area confronting the slit 2 compared with the other parts of the shearing table. A section of the shearing table is formed as a sector as shown in Figure 6 to Figure 9 for spreading the threads and preventing the threads from twine each other during the shearing operation.

Another embodiment of a modified shearing table is shown in Figure 7, in which a permeable conveyer belt 10 is disposed on the shearing table.

Further another embodiment of the shearing table is shown in Figure 8, in which a rolling cylinder 11 having small apertures on its surface is disposed at the top edge of the shearing table where the shearing table faces the slit 2 of the suction box.

Another embodiment of the shearing table is also shown in Figure 9, in which a rolling cylinder 11 having small apertures on its surface is disposed at the top edge of the shearing table and further a permeable conveyer belt 10 is disposed on the rolling cylinder where the shearing table faces the slit 2 of the suction box.

The conveyer belt consists of a roughly woven fabric, a fabric having small apertures, or a wire net or the like, which are all permeable and is driven by an electric motor 21 with a pulley and a driving belt.

The shearing table 8 is movable thereby adjusting the position of the shearing table relative to the rotating blade 3 and the fixed blade 7.

The shearing table is rotatably mounted on a mount table 8a which is operated through a rack and pinion mechanism (not shown). When an operator put a lever in an operation position, the shearing table 8 changes its position with respect to the slit 2 of the suction box 1 therefore a distance between the top edge of the shearing table and the slit 2 is adjusted. The shearing table is rotatable with respect to an axis 8b so that an angle of the shearing table with respect to the fixed blade is adjustable.

In this embodiment, the blades (the rotating blade and the fixed blade) and the shearing table are arranged almost level position, but the lay out of these parts is not restricted in this way. They may also be arranged vertically.

An upper guide table 15 and a lower guide table both of which guide the cloth subjected to shearing, are belt conveyers consisting of a wire

net or a fabric and driven by an electric motor 21 and a pulley and a driving belt.

There is also provided a supplying roller 16 for supplying a cloth to the shearing apparatus and a receiving roller 17 receiving the processed cloth. Both rollers are driven by electric motors 20 and 22.

An operation of the shearing apparatus is controlled through a console table 13.

The width of the slit 2 is adjusted by changing the position of the outer wall 1b, the shutter 1c of the outer wall, and the fixed blade, depending on the features of the cloth subjected to shearing. Then the position and the angle of the shearing table 8 with respect to the fixed blade or the suction box are adjusted by operating the lever 14, also depending on the features of the cloth. The cloth is placed on the supplying roll 16 through the shearing table 8, the upper guide table 15, the lower guide table 18, and to the receiving roll 17. The electric motors 20,21,22 drive the supplying roll and the receiving roll and the cloth is supplied to the shearing apparatus. The rotating blade is driven by the electric motor 23, and shearing is conducted with the rotating blade and the fixed blade. While operating the shearing apparatus, inside the suction box is kept negative pressure by the operation of the suction means 12 thereby inhaling the air through the slit 2 into the suction box from the outside of the suction box.

The air is introduced smoothly into the suction box between the blades 6,6 of the rotating blade through the ditches 5 disposed on an outer peripheral of the cylinder 4.

The threads of the cloth are raised and stretched by the air flow therefore shearing is conducted properly and sheared threads are easily introduced into the suction box by the air flow without getting stuck between the blades 6,6 of the rotating blade.

The suction power of the suction means is not necessarily big to inhale the sheared threads and the suction means 19 breathe the air inside the shearing table for sticking the cloth onto the shearing table so that the cloth passing through the shearing table will not float up from the shearing table.

And further more, as shown in Figure 7 and Figure 9, in which a permeable conveyer belt 10 is disposed on the shearing table 8 and being driven by the electric motor, shearing threads on the cloth is conducted without any troubles and in addition, it is possible to shear threads of a sheet of cloth having short length by sucking the sheet of cloth onto the conveyer belt.

As shown in Figure 8 and Figure 9, a rolling cylinder 11 having small apertures on its surface is disposed at the top edge of the shearing table 8

where the shearing table faces the slit 2 of the suction box 1, so that threads are sheared very smoothly.

Claims

1. A shearing apparatus for shearing raised threads upon a cloth or the like comprising a rotating blade 3, a fixed blade 7 cooperating with said rotating blade and a shearing table 8 on which the cloth is conveyed to the blades in which, the rotating blade 3 is disposed inside a suction box 1 having a slit 2 and being connected to a suction means and confronting said slit 2, the fixed blade 7 is disposed outside the suction box and confronting the slit 2 and the shearing table 8 is disposed outside said suction box and of which the top edge is confronting said slit 2.

2. A shearing apparatus of claim 1, wherein the outer wall of said slit 2 is hinged to said suction box 1 being rotatable with respect to the wall of the suction box 1 thereby adjusting an angle of said outer wall with respect to said suction box 1, and a shutter disposed at said outer wall.

3. A shearing apparatus of claim 1 or 2 wherein said rotating blade 3 comprises a cylinder 4 having plurality of radially disposed ditch 5 on the surface of the cylinder where blades 6 extending lengthwise are fixed parallel each other.

4. A shearing apparatus of claim 1, 2 or 3 wherein said shearing table 8 is movable with respect to the suction box 1 thereby adjusting the relative position.

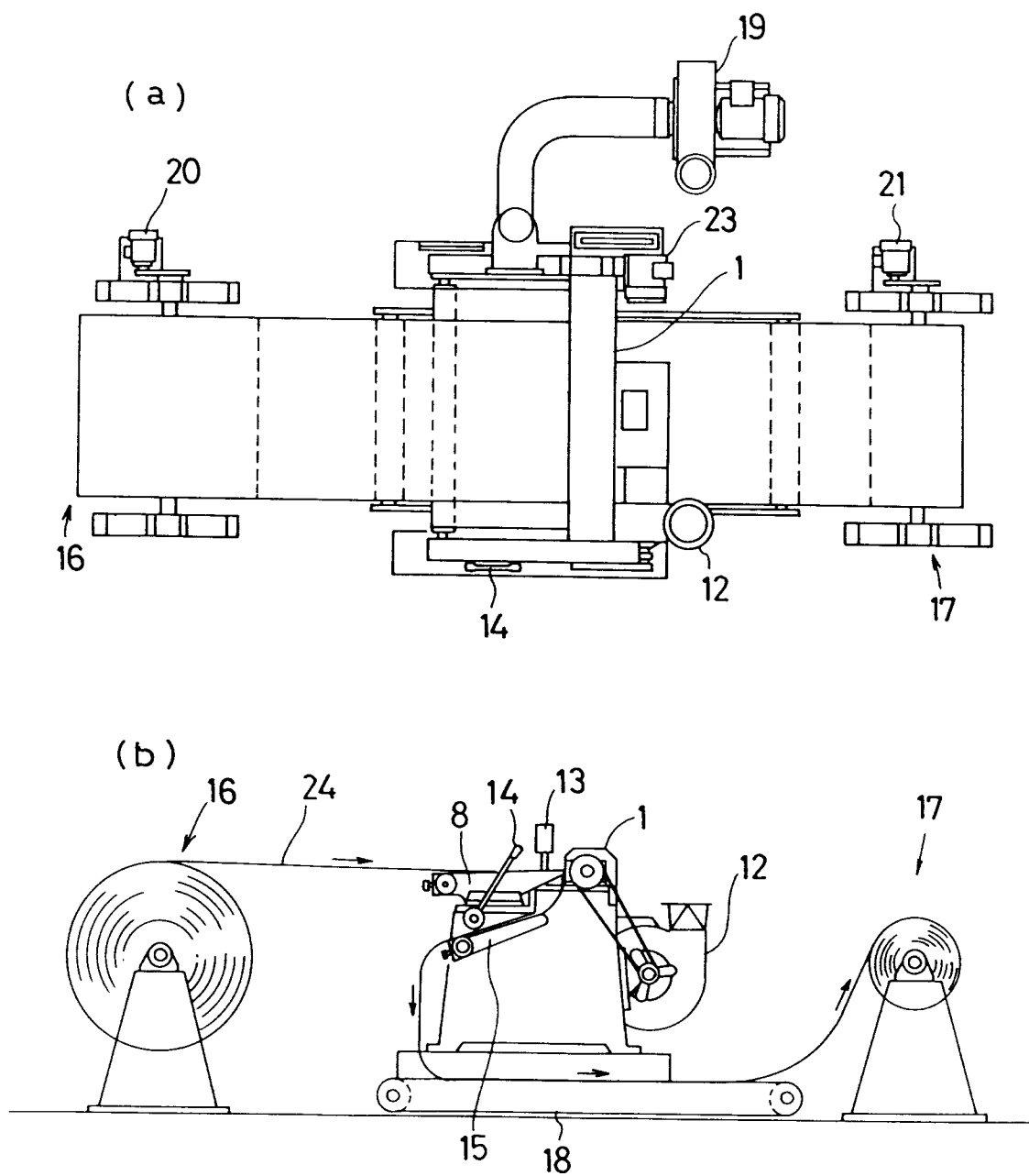
5. A shearing apparatus for shearing raised threads upon a cloth or the like comprising a rotating blade 3, a fixed blade 7 cooperating with said rotating blade and a shearing table 8 on which the cloth is conveyed to the blades in which, the rotating blade 3 is disposed inside a suction box 1 having a slit 2 and being connected to a suction means and confronting said slit 2, the fixed blade 7 is disposed outside the suction box and confronting the slit 2 and the shearing table 8 is hollow, having many apertures on its surface, connected to a suction means and disposed outside said suction box 1 and of which the top edge is confronting said slit 2.

6. A shearing apparatus of claim 5, wherein a permeable belt conveyer slidably disposed upon said hollow shearing table 8.

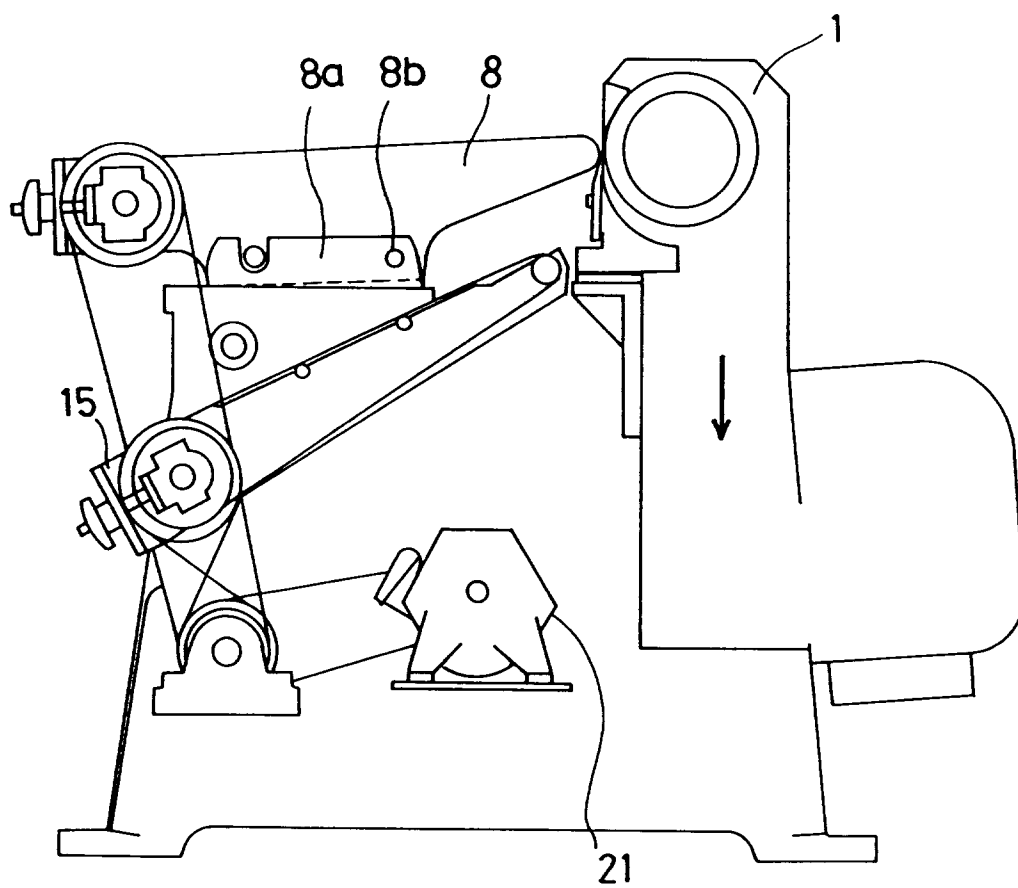
7. A shearing apparatus of claim 5 or 6 wherein a roller 11 having apertures on its surface being disposed at the top edge of the shearing table 8 where confronting the slit 2 of the suction box 1.

8. A shearing apparatus of claim 5, 6 or 7 wherein said shearing table 8 is movable with respect to the suction box 1 thereby adjusting the relative position.

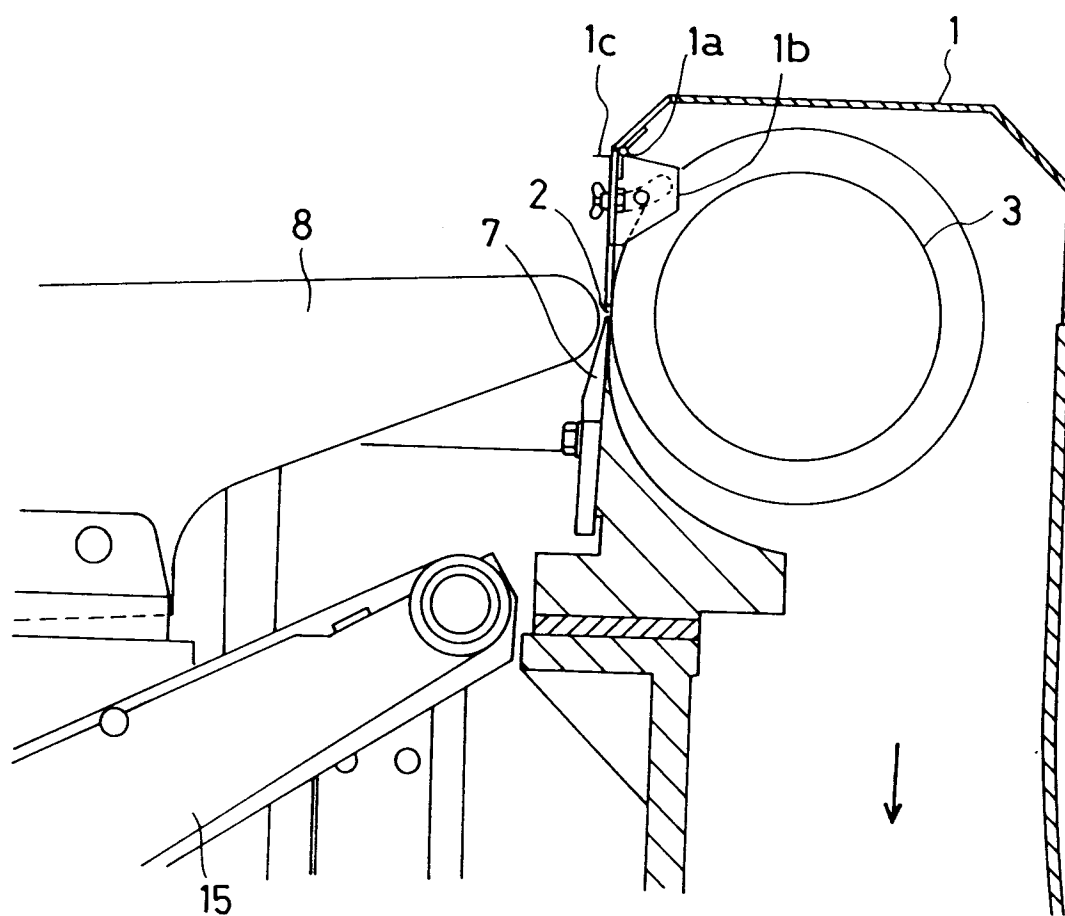
【 F i g . 1 】



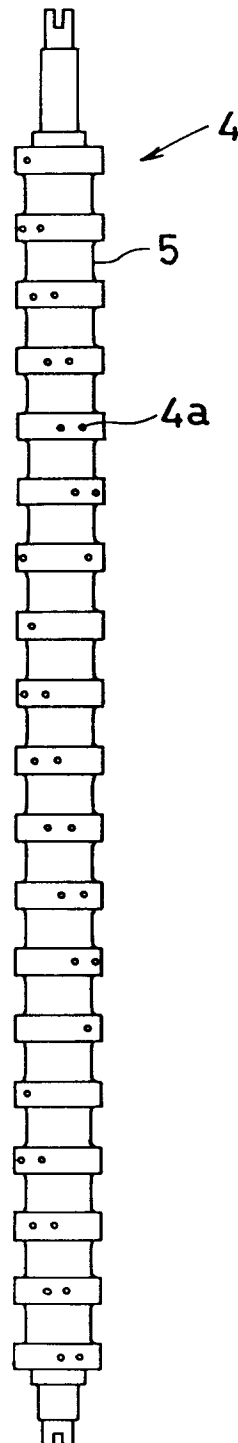
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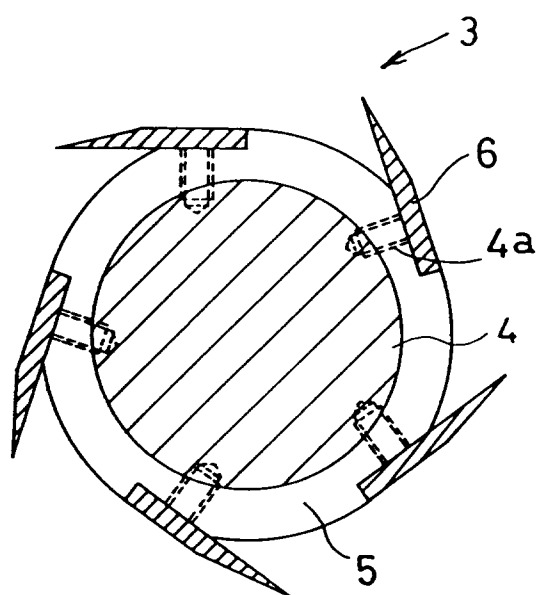
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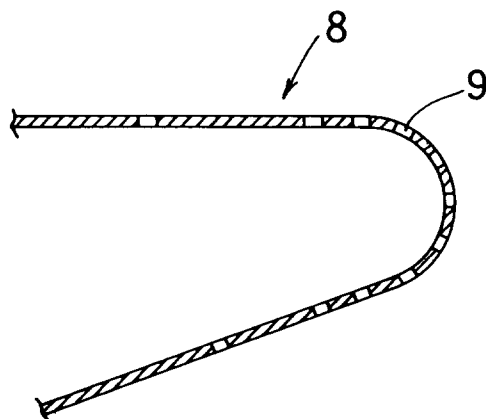
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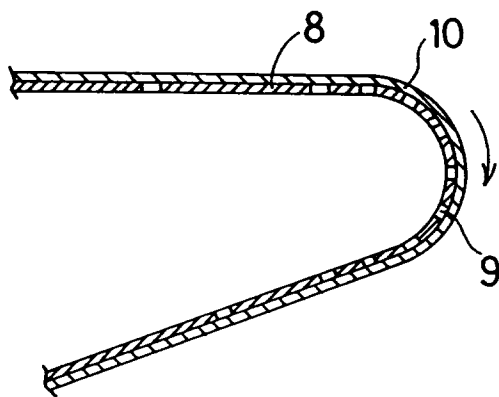
【 F i g . 5 】



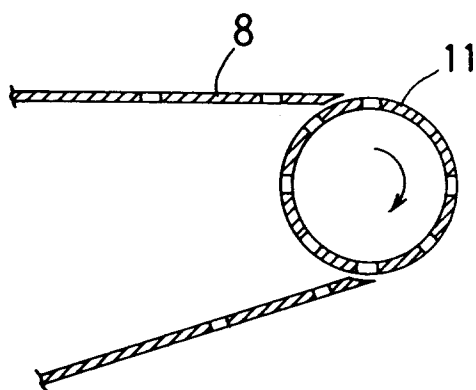
【 F i g . 6 】



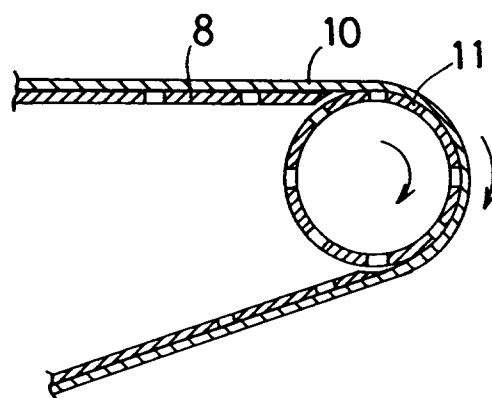
【 F i g . 7 】



【 F i g . 8 】



【 F i g . 9 】





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EUROPEAN SEARCH REPORT

Application Number
EP 93 30 6872

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
X	EP-A-0 106 068 (JOHANNES MENSCHER) * the whole document * ---	1-8	D06C13/00
X	EP-A-0 106 969 (JOHANNES MENSCHER) * the whole document * ---	1-8	
A	DE-B-12 14 191 (FRANZ MÜLLER) -----		
			TECHNICAL FIELDS SEARCHED (Int.Cl.5)
			D06C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 17 January 1994	Examiner PETIT, J
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